Machinist
Level 4

10-2019/Rev 05-2025

Apprenticeship Manitoba

Machinist

Unit: **D1 Job Planning**

Level: Four

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to introduce knowledge of the procedures used to plan and organize jobs.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Identify sources of information relevant to job planning. a. Documentation • Work orders/shop orders • Technical data • Resource materials b. Drawings c. Related professionals d. Clients e. Quality standards • International Organization for Standardization (ISO)	**10%**
2. Interpret and complete relevant trade documentation.	**5%**
3. Interpret advanced drawing specifications. a. Tolerance b. Finish requirements c. Geometric dimensioning and tolerancing	**20%**
4. Identify the consideration and requirements when planning jobs and job tasks. a. Materials b. Machines and tooling c. Sequence of work d. Clean-up	**20%**
5. Calculate cutting time requirements.	**10%**
6. Identify the considerations and requirements for selecting machines and tooling to complete specified jobs.	**20%**

7. Calculate materials required to complete specified jobs. 15%

***

Apprenticeship Manitoba

Machinist

Unit: **D2 Journeyperson Trainer**

Level: Four
Duration: 7 hours
Theory: 7 hours
Practical: 0 hours

Overview:

Machinist technical training offers an entry-level orientation to the challenges of apprenticeship training as it relates to the development of core tasks and skill requirements, as well as social competencies. This unit introduces senior apprentices to the responsibilities of workplace training that they will assume as supervising journeypersons. Most trades have a rich tradition of refreshing and sharing their trade skills from one generation of trade practitioner to the next. This unit orients senior apprentices to some of the practical and conceptual tools that can enable them to contribute to this trade heritage when they become certified journeypersons and, ultimately, journeyperson trainers.

The journeyperson's obligation to assist entry-level apprentices to develop skills and knowledge is complex and challenging. It involves safety considerations, employer expectations, provincial regulations, as well as the tradition of skills stewardship that links modern practice with the long history of workplace teaching and learning that defines the apprenticeable trades. The ability to offer timely and appropriate support to apprentices is itself an important area of trade learning. This unit presents material intended to help refine this ability through reflection and discussion by senior apprentices, and discussion with their in-school instructor and journeyperson trainer.

This content reflects Manitoba and Canadian standards prescribed for journeyperson-level supervisory capabilities, as well as key topics in current research on the importance of workplace training in apprenticeship systems. These detailed descriptors represent suggested focal points or guidelines for potentially worthwhile exploration, and are neither mandatory nor exhaustive.

Objectives and Content: **Percent of Unit Mark (%)**

1. **Compare/contrast role-options and responsibilities of the supervising journeyperson.** **40%**
   a. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used.
   b. Accountability for results: e.g. journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.
   c. Long-term vs. short-term supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes.
   d. Formally vs. informally structured – e.g. supervision assignment is part of a prescribed cycle of assignments involving coordination among multiple journeypersons; apprentice is trained according to an individual training plan negotiated with employer.
   e. Types of supervisory role options and what is implied by each:
      - Journeyperson Trainer (JT) role: often initiated by someone other than apprentice, and limited to a particular skill set, task, or production requirement

- Mentor role: often initiated by apprentice, and relatively open-ended regarding content, duration, etc.
- Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner.
- Coordinator role: often a senior-level journeyperson appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices.
- Other roles: may be improvised by journeyperson, such as combination or multiple roles of the above.

2. Describe and demonstrate common requirements about providing journeyperson level supervision. 60%

a. Apprenticeship learning adapted to journeyperson supervision assignments and a journeyperson perspective:
   - Application of adult education concepts to trades teaching and learning (e.g. responsibilities and expectations of senior-level apprentices).
   - Practical significance of 'styles' of adult learning and teaching.
   - Helping senior-level apprentices integrate in-school technical training and on-the-job practical training experiences.
   - Providing help and guidance about new tasks and skills.
   - Providing help and guidance about fixing mistakes.
   - Learning and teaching "the ropes" – socialization of apprentice within a community of trade practice (e.g. how to borrow a tool, interrupt a journeyperson, and seek advice of experienced co-workers).
   - Coverage and documentation of prescribed tasks and subtasks where applicable.
   - Discuss the limits of the journeyperson trainers' own responsibilities and competence (e.g. scope, willingness to train, etc.).
   - Benefits of maintaining a personal record of achievements, ideas, and needs as a journeyperson trainer (e.g. resume, portfolio, training credentials, logbook, etc.).

b. Individual reflection and guided group discussion about personal experiences of workplace learning as an apprentice:
   - Identification of best and worst practices of journeyperson trainer.
   - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences.
   - Development of professional standards and work ethics about responsibility to share one's knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc.).
   - Qualities of a good journeyperson trainer.
   - Components of workplace journeyperson training.
   - Processes and recommended practices re: journeyperson training.
   - Troubleshooting problems re: supervision assignments.

c. Role of assessment in supervising, coaching, or guiding other people to learn or improve their skills (e.g. formative and summative evaluation), and how this might contribute to how the journeyperson-level supervision task is approached in future.

d. Compare and contrast discussion results with current knowledge and resources about workplace training methods as they apply to journeyperson-level supervision assignments.

e. Other (as may be specified by instructor).

***

Apprenticeship Manitoba

Machinist

Unit: **D3 Quality Inspection**

Level: Four

Duration: 27 hours

Theory: 7 hours

Practical: 20 hours

Overview:

This unit of instruction is designed to introduce knowledge of quality inspection and its use. The unit introduces knowledge of the Cartesian Coordinate System and its use. In addition, the unit introduces knowledge of coordinate measuring machines, their applications and procedures for use.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with quality inspection. a. Basic dimension b. Limits c. Tolerance d. Allowance	**10%**
2. Identify types of precision gauges used in quality inspection and describe their applications and procedures for use. a. Fixed b. Cylindrical c. Ring d. Taper e. Snap f. Thread	**10%**
3. Identify types of precision measuring instruments used in quality inspection and describe their applications and procedures for use.	**10%**
4. Describe the procedures used to inspect workpieces.	**10%**
5. Perform procedures used to inspect workpieces.	**15%**
6. Identify types of comparators and describe their applications and procedures for use. a. Mechanical b. Electronic c. Optical d. Pneumatic	**10%**

7.	**Perform procedures for use of comparators and their applications.**	**10%**
8.	**Describe the Cartesian Coordinate System, its purpose and applications.**	**5%**
9.	**Identify types of coordinate measuring machines and describe their components, applications and procedures for use.**	**10%**
10.	**Perform coordinate measurement, applications and procedures.**	**10%**

****

Apprenticeship Manitoba

Machinist

Unit: D4 Computer Numerical Control (CNC) III - Operation

Level: Four

Duration: 202 hours

Theory: 77 hours

Practical: 125 hours

Overview:

This unit of instruction is designed to expand knowledge of CNC programming. In addition, the unit introduces knowledge of CNC machine-tools, their set up, maintenance and procedures for use.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Identify computer numerical control (CNC) control units and describe their purpose.	**5%**
2. Identify types of basic programming codes and languages and describe their applications. a. G-codes b. M-codes c. Conversational	**15%**
3. Perform basic programming codes and languages.	**15%**
4. Identify CNC related reference points and their location. a. Review process documentation b. Calculate coordinates for tool path c. Create basic program d. Input program data into control memory e. Optimize program	**10%**
5. Describe the procedures used to set up CNC machines. a. Send/receive program b. Select and set up tooling and tool holder c. Dial tools d. Set up workpiece e. Establish work datum f. Verify program	**10%**
6. Perform procedures used to set up CNC machines.	**10%**

7. Describe the procedures used to operate CNC machines. 10%

a. Adjust offsets
b. Load/unload workpiece
c. Monitor process
d. Interrupt program cycle
e. Restart program cycle

8. Perform procedures used to operate CNC machines. 15%

9. Describe the procedures used to perform basic preventative maintenance. 10%

****

Apprenticeship Manitoba

Machinist

Unit: **D5 Pre-Interprovincial Exam Review**

Level: Four
Duration: 30 hours
Theory: 35 hours
Practical: 0 hours

Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required to pass the InterProvincial Examination. It promotes a purposeful personal synthesis between on-the-job learning and the content of in-school technical training. The unit includes information about the significance of Interprovincial (Red Seal) certification and the features of the Interprovincial Examination.

Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a 'Pass/Fail" grade will be recorded for the unit in its entirety.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe the significance, format and general content of Inter-Provincial (IP) Examinations for the trade of Machinist. a. Scope and aims of Interprovincial (Red Seal) certification; value of certifications b. Obligations of candidates for Interprovincial certification • Relevance of Interprovincial Examinations to current, accepted trade practices; industry-based provincial and national validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content c. Multiple-choice format (four-option) item format, Red Seal standards for acceptable test items d. Government materials relevant to the Interprovincial Examinations for apprentice Machinists • Red Seal Occupational Standard (RSOS) – for Machinist; prescribed scope of the skills and knowledge which comprise the trade • RSOS "Pie-chart" and its relationship to content distribution of Interprovincial Examination items • Red Seal Examination Breakdown • Red Seal Self-Assessment Guide • Apprenticeship Manitoba Technical Training package	**n/a**
2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations. a. Personal preparedness • Rest • Nutrition • Personal study regimen	**n/a**

- Prior experience in test situations (e.g., Unit Tests)

b. Self-assessment, consultation and personal study plan
   - Self-assessment of individual strengths/weaknesses in trade related skills and knowledge
   - Approved textbooks
   - Study groups

3.	**Review program content regarding the major work activity of performs common occupational skills.**	**n/a**
4.	**Review program content regarding the major work activity of performs benchwork.**	**n/a**
5.	**Review program content regarding the major work activity of machines using power saws.**	**n/a**
6.	**Review program content regarding the major work activity of machines using drill presses.**	**n/a**
7.	**Review program content regarding the major work activity of machines using conventional lathes.**	**n/a**
8.	**Review program content regarding the major work activity of machines using conventional milling machines.**	**n/a**
9.	**Review program content regarding the major work activity of machines using precision grinding machines.**	**n/a**
10.	**Review program content regarding the major work activity of machines using computer numerical control (CNC) machines.**	**n/a**

****